Allergic management of Meniere's disease: An outcome study

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The effect of allergy immunotherapy and elimination of suspected food allergens was evaluated in patients with Meniere's disease. A total of 137 patients with Meniere's disease for whom allergy treatment had been recommended were identified and were mailed and returned a symptoms questionnaire. One hundred thirteen had received allergy treatment; 24 did not have treatment and served as a control group. Information regarding history, signs and symptoms, allergy test results, and audiologic data were obtained by chart review. The 113 patients treated with desensitization and diet showed a significant improvement from pretreatment to posttreatment in both allergy and Meniere's symptoms. Ratings of frequency, severity, and interference with everyday activities of their Meniere's symptoms also appeared better after allergy treatment than ratings from the control group of untreated patients. Vertigo control results, by use of the American Academy of Otolaryngology–Head and Neck Surgery classification, categorized 47.9% as class A or B. Hearing was stable or improved in 61.4%. Patients with Meniere's disease can show improvement in their symptoms of tinnitus and vertigo when receiving specific allergy therapy. The inner ear may be the target, directly or indirectly, of an allergic reaction. (Otolaryngol Head Neck Surg 2000;122:174-82.)

The pathogenesis of Meniere's disease is known to be a hydropic distention of the endolymphatic system. Whereas Meniere's disease is, by definition, idiopathic, it has been ascribed to various causes, including trauma, viral infections, and more recently, autoimmune factors.[1] The first reference to the role of allergies in the development of Meniere's disease was in 1923 by Duke.[2] In the 1970s, numerous reports in the otolaryngic literature documented improvement in vertigo, tinnitus, and hearing with desensitization to inhalant allergens and an elimination diet for food allergies.[3-5] Although it was acknowledged that these reported patients showed clinical improvement, the suggestion that this was due to immunomodulation was viewed with some skepticism because the inner ear was thought to be immunoprivileged.

With McCabe's description of autoimmune sensorineural hearing loss, interest again focused on a possible immunologic etiology of Meniere's disease.[6] Hearing improvement and control of vertigo have been reported with the use of immunosuppressive and cytotoxic regimens as well as the use of plasmapheresis to remove presumed autoantibodies and circulating immune complexes.[7-9]

Although clinical improvement often occurs with these regimens, test results for autoimmune abnormalities are usually normal in patients with Meniere's disease. Only 30% of patients with Meniere's disease show evidence of true autoantibody response to specific anticochlear antibody by Western blot assay, whereas tests of cell-mediated immunity, such as the lymphocyte transfer test and the lymphocyte migration inhibition assay, have either been inconsistent or have been found to be normal even in patients with known causes of autoimmune dysfunction of the inner ear, such as Cogan's syndrome.[7]

Many of the clinical characteristics of Meniere's disease suggest an underlying autoimmune etiology. The tendency of Meniere's disease to wax and wane, becoming active again after long periods of remission, suggests an inflammatory component. It is bilateral in a significant number of cases. A delayed Meniere's-like picture may develop in a normal ear after trauma to the contralateral ear. An increased level of circulating immune complexes in patients with Meniere's disease has been noted in several studies.[10,11] Finally, it is initially often responsive to treatment with steroids.

With an incidence in the population of 20%, allergy is certainly the most common autoimmune disease. The whole concept of a sudden influx of fluid into the endolymphatic sac, producing a rupture of Reissner's membrane and resulting in production of Meniere's symptoms, would be consistent with the vasodilatation, fluid transudation, and inflammatory reaction that are

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the hallmarks of an allergic reaction. Indeed, in one study, 50% of unselected patients with Meniere's disease who were given questionnaires to evaluate possible autoimmune diseases or symptoms reported a known history of inhalant and/or food allergy.[11]

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The inner ear demonstrates both cellular and humoral immunity, and the seat of immunoactivity in the inner ear appears to reside in the endolymphatic sac and duct. Immunoglobulins G, M, and A and secretory component are all found in the endolymphatic sac, whereas numerous plasma cells and macrophages are found in the perisaccular connective tissue.[12] Mast cells have also been identified in the perisaccular connective tissue. After sensitization, IgE-mediated degranulation of the mast cells results in eosinophilic infiltration of the perisaccular connective tissue and the clinical production of endolymphatic hydrops.[13]

The endolymphatic sac has been shown to be capable of both processing antigen and producing its own local antibody response.[14,15] It has a highly vascular subepithelial space containing numerous fenestrated blood vessels.[16] Arteriole branches of the posterior meningeal artery supply the endolymphatic sac and duct.[17] Whereas for the most part the labyrinth is similar to the rest of the central nervous system in being protected by a blood-labyrinthine barrier, the posterior meningeal artery is fenestrated and offers a peripheral portal of circulation. In other parts of the body, fenestrated vessels supplying organs involved in resorption (eg, kidney, choroid) are especially susceptible to damage by immune complex deposition.

With an increased understanding of the immunology of the ear, especially the important role played by the endolymphatic sac, one wonders whether there could be a relationship between type I hypersensitivity reaction and the production of Meniere's disease symptoms. The purpose of this study was to evaluate the effectiveness of specific allergy immunotherapy for inhalant allergens and food elimination of suspected food allergens on the course of patients with Meniere's disease.

METHODS AND MATERIALS

Subjects

Clinic files were reviewed for all patients with Meniere's disease who were seen in the allergy clinic and for whom allergy treatment had been recommended between April 1, 1986, and April 1, 1993. Indications for allergy evaluation included bilaterality; known history of allergy; Meniere's symptoms that were related to seasons, weather change, or food ingestion; steroid-responsive or steroid-dependent symptoms; or failure to respond to the "traditional" medical and surgical treatments for Meniere's disease. Allergy treatment was recommended based on positive testing results (see Allergy Testing and Treatment Techniques). A total of 286 patients were identified and sent questionnaires. After receipt of completed questionnaires (64% return rate), those who indicated that they had received allergy treatment elsewhere were reclassified into the allergy-treated group. The remainder were considered the control group. One hundred thirty-seven cases with complete and consistent data on all key items were included in the final analyses, 113 in the allergy treated group and 24 in the control group.

Materials

Clinical information obtained from the medical charts included allergy-related signs and symptoms, medical history, allergy test results, treatment recommendations, medication, and outcome. For analysis purposes, the best audiologic test in the 6 months before allergy treatment (or initial visit for those not treated) and the last audiologic test results were used. Dizziness, tinnitus, and other allergic symptom outcomes were rated as "improved," "no change," or "worse" if specific indicators were present in the chart; if not, no assessment was made, and the data were considered missing.

The patient questionnaire included questions based on the American Academy of Otolaryngology–Head and Neck Surgery (AAO-HNS) guidelines for the reporting of treatment results in Meniere's disease.[18] Questions for the treatment group covered the frequency, severity, and interference in daily lives of spinning dizziness, unsteadiness, hearing loss, and tinnitus before and after allergy treatment. The questionnaire also asked about allergy shots, diets, surgery performed, and medication taken for Meniere's disease since the beginning of allergy treatment. The questionnaire for the control group was similar but asked only about current symptoms, allergy testing, previous allergy treatment, surgery, and medication. Closed-set questions asked patients to rate their Meniere's disease symptoms for severity, frequency of occurrence, and interference with everyday activities on a 5-point scale (eg, not at all severe to extremely severe) and to rate disability caused by unsteadiness on a 4-point scale (no disability to severe disability). Open-ended questions asked patients to list their medications and surgical procedures and to comment on their Meniere's disease symptoms and treatment.

Procedures

The quasiexperimental design made use of an allergy-treated group and a nonrandom control group that consisted of patients tested for allergies and for whom treatment was recommended but who did not receive treatment.

Because patients were free to choose whether to participate by completing the questionnaire and because this was a survey study only, institutional review board approval and signed informed consent were not deemed necessary. The

Table 1. Subject characteristics

Characteristic	Treatment group	Control group	Statistical significance
Age (y)*	55.3 ± 13.4 (113)	55.1 ± 17.8 (24)	NS
Sex (M/F)†	32.7/67.3 (113)	25/75 (24)	NS
Ear†			
Right	33.6 (113)	26.1 (24)	NS
Left	30.4	52.2	NS
Bilateral	35.7	21.7	NS
Positive history†			
Childhood history of allergy	81.3 (91)	71.4 (21)	NS
Family history of allergy	78.9 (90)	66.7 (21)	NS
Patient suspects food reaction	47.1 (104)	42.9 (21)	NS
Symptoms seasonal	53.5 (101)	40.9 (22)	NS
Symptoms weather related	25.5 (98)	33.3 (21)	NS
Nasal congestion	85.4 (103)	83.3 (24)	NS
Rhinitis	84.6 (104)	87.5 (24)	NS
Pharyngitis	12.7 (102)	8.7 (23)	NS
Other allergic symptoms	31.3 (99)	40.9 (22)	NS
Known autoimmune disease	8.0 (112)	9.1 (23)	NS
Prior surgery (shunt or nerve section)	25.2 (111)	29.2 (24)	NS
Eczema	23.5 (102)	26.1 (23)	NS

NS, Not significant.
*Data expressed as mean ± SD (number of patients).
†Data expressed as percentage (number of patients).

questionnaires were sent, with an explanatory letter, by mail to ensure confidentiality, to allow adequate time to answer questions that might require consultation, and to increase accessibility (many patients resided out of state). Questionnaires asked for no identifying information but were coded so that research support staff could match them with the clinical data forms. A reminder letter and replacement questionnaire were sent after 3 months for those who had not yet responded. After the questionnaires were received and reviewed, telephone follow-ups were conducted by a research methodologist to collect information on inconsistent and missing data, especially when the initial classification of "not treated" changed. Of the 182 questionnaires returned, 137 were included in the analyses. The remaining cases were excluded because key data were incomplete and the patient could not be contacted.

Statistical Analysis

The allergy-treated and control groups were statistically compared on subject characteristics and disease symptoms to determine whether they represented the same population of patients. Because of the large difference in sample sizes, nonparametric statistics were used (χ^2 and Mann-Whitney *U* tests). For the treated group, comparisons were made between pretreatment and posttreatment symptom ratings and test results with paired *t* tests. Additional analyses to evaluate factors related to outcome were also performed with both parametric and nonparametric tests, as appropriate. Statistical significance was set at $P \leq 0.05$, 2-tailed.

Allergy Testing and Treatment Techniques

Inhalant allergies. Testing techniques endorsed by the American Academy of Otolaryngic Allergy and the AAO-HNS were used to establish a safe starting dosage of immunotherapy. Although at our practice my coworkers and I blend in vitro and in vivo testing methods, we primarily use skin end-point titration because of its slightly higher level of sensitivity. This test technique has been well described elsewhere.[19]

Food allergies. When possible, a diagnosis of food allergy was established with the deliberate oral challenge feeding test, whereby a cause-and-effect relationship is observed between ingestion of a given food and production of symptoms. Patients were instructed to eliminate suspected foods for at least 72 hours before the oral challenge test. This increases the degree of symptoms produced, making it easier for both patient and observer to determine a clinical reaction to a given food.

When oral challenge testing was not feasible, a subcutaneous or intradermal provocative food test (PFT) was performed by injection of an extract of the suspected food. With this test, symptoms are generally produced within 30 minutes of injection and may be easily observed by both the patient and examiner.

Once diagnosed, food hypersensitivities were treated by an elimination and/or rotation diet. Alternatively, if there were multiple food allergens or if the patient was unable to avoid eating the food, treatment by injection or sublingual drops of the neutralizing dose established during PFT was used in some cases.

RESULTS

Subject Characteristics

Table 1 provides demographic and history information for the 2 groups. They did not differ significantly in any of these subject characteristics. In both groups, the proportion of women was greater than the proportion of men. Bilateral Meniere's disease had been diagnosed in 35.7% of the allergy-treated group and 21.7% of the control group, although this was not a statistically significant difference. Most patients in both groups had a childhood history of allergy as well as a family history of allergy. Nasal congestion and rhinitis were extremely common in both groups. Prior surgery for their Meniere's symptoms had been performed in 25.2% of the allergy-treated group and 29.2% of the control

Table 2. Descriptive information for Meniere's disease symptoms of the allergy treatment group (pretreatment) and the control group

	Treated group (pretreatment)				Control group			
Variables	Median	Mean	SD	n	Median	Mean	SD	n
Frequency of symptoms								
Vertigo	3.0	6.2	8.4	102	1.0	3.8	6.8	23
Tinnitus	4.0	4.0	1.1	111	5.0	4.1	1.3	23
Unsteadiness	3.0	3.1	1.0	111	3.0	3.3	0.9	23
Runny nose	3.0	3.4	1.1	110	3.0	3.0	1.1	23
Sore throat	2.0	2.3	1.2	108	2.0	2.1	0.9	23
Ear infection	1.0	2.0	1.2	107	1.0	1.7	1.0	23
Eczema	1.0	1.9	1.3	110	1.0	1.9	1.2	23
Asthma	1.0	1.5	0.9	108	1.0	1.2	0.7	23
Severity of symptoms								
Vertigo*	4.0	4.2	1.0	99	3.0	2.9	1.7	20
Tinnitus	3.0	2.9	1.1	103	3.0	3.0	1.1	19
Unsteadiness†	3.0	3.1	1.1	99	2.0	2.4	1.3	24
Interference with everyday activities								
Vertigo‡	4.0	4.0	0.9	104	3.0	3.1	1.3	23
Tinnitus	2.0	2.5	1.1	106	3.0	2.9	1.4	21
Unsteadiness†	3.0	3.2	1.0	102	3.0	2.7	1.2	24
Hearing loss	3.0	3.4	1.2	113	4.0	3.7	1.3	23
Disability								
Unsteadiness†	2.0	2.5	1.0	95	2.0	2.0	1.1	24

Rating systems: *Frequency* (1, never; 2, almost never; 3, sometimes; 4, almost always; and 5, always); frequency of vertigo in days per month ranges from 0 (never) to 30 (always). *Severity* (1, not at all severe; 2, somewhat severe; 3, moderately severe; 4, quite severe; and 5, extremely severe). *Interference* (1, never; 2, almost never; 3, sometimes; 4, almost always; 5, always). *Disability* (1, no disability; 2, mild disability; 3, moderate disability; and 4, severe disability).
*$P < 0.001$.
†$P < 0.05$.
‡$P < 0.005$.

group. For those patients tested, mean IgE levels were significantly higher in the allergy-treated group (mean 102.5 U/mL, SD 211.5, median 28 U/mL, range 1-1080 U/mL) than in the control group (mean 36.7 U/mL, SD 63.9, median 10.5 U/mL, range 2-215 U/mL) ($P \leq 0.036$, Mann-Whitney *U* test). Normal IgE ranges from 0 to 100 U/mL.

The groups did not differ significantly in their mean pretreatment pure-tone averages or speech discrimination scores in either the affected ear or the unaffected ear, with mean pure-tone averages for the affected ears of 45.3 dB (SD 21.2) and 51.6 dB (SD 29.0) for the treatment and control groups, respectively. The recently recommended AAO-HNS hearing stage distribution[20] for the treatment group was 18.9%, 18.9%, 50.5%, and 11.6% for stages 1 through 4 (≤25, 26-40, 41-70, and >70 dB), respectively. The control group did not differ significantly.

Finally, the 2 groups were compared with regard to their pretreatment symptom frequency, severity, and interference ratings (Table 2). The allergy-treated group had significantly more severe symptoms in several categories (vertigo and unsteadiness severity and amount of interference with everyday activities, and disability) than the control group. The fewer disease symptoms of the control patients may relate to their choice not to pursue the allergy treatment recommendation. Because the control group had significantly fewer severe symptoms, no statistical comparisons between the control group and the allergy treated group after treatment were made. Instead, paired comparison from pretreatment to posttreatment within the allergy-treated group is made, along with informal comparison between groups.

For the patients in the allergy-treated group, PFT showed wheat with the highest rate of positive tests (68.2%), followed by soy (64.2%). There was also a positive response rate of greater than 50% to milk, corn, egg, and yeast. For inhalant allergy skin test results, serial end-point dilutions were averaged across inhalants within the categories of grass, weeds, trees, and molds. Dust mite and cat were also tested frequently. Typical end points were at dilutions 2 or 3 (1/500 or 1/2500) but did vary, with some patients showing considerable sensitivity. In addition to allergy shots, dietary changes were recommended for patients showing sensitivity to foods. Patients were asked to rate how well they main-

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Table 3. Paired comparison of Meniere's disease symptoms before and after treatment for the allergy-treated group

Variables	N*	Pretreatment			Posttreatment		
		Median	Mean	SD	Median	Mean	SD
Frequency of symptoms							
Vertigo†	72	2.5	4.6	6.9	0.5	1.6	4.5
Tinnitus†	84	5.0	4.1	1.2	5.0	3.8	1.3
Unsteadiness‡	84	3.0	3.0	1.0	2.0	2.4	1.0
Runny nose‡	83	3.0	3.4	1.1	3.0	2.7	0.9
Sore throat‡	82	2.0	2.3	1.1	2.0	1.8	0.8
Ear infection‡	79	1.0	1.9	1.1	1.0	1.6	0.9
Eczema§	84	1.0	1.9	1.2	1.0	1.8	1.0
Asthma	80	1.0	1.5	1.0	1.0	1.4	1.0
Severity of symptoms							
Vertigo‡	45	4.0	4.2	0.9	2.0	2.7	1.6
Tinnitus‡	72	3.0	2.9	1.1	2.0	2.1	1.2
Unsteadiness‡	61	3.0	3.0	1.1	2.0	2.0	1.2
Interference with everyday activities							
Vertigo‡	49	4.0	3.8	0.9	3.0	2.8	1.3
Tinnitus‡	78	2.0	2.4	1.1	2.0	2.0	1.0
Unsteadiness‡	65	3.0	3.3	1.0	2.0	2.3	1.1
Hearing loss‡	86	3.0	3.5	1.2	3.0	2.8	1.3
Disability							
Unsteadiness‡	61	2.0	2.6	1.0	2.0	1.8	0.9

See Table 2 for rating scales.
*Patients with missing data were excluded pairwise; therefore the number of patients for each variable can differ.
†$P < 0.005$.
‡$P < 0.001$.
§$P < 0.03$.

tained the diet. Most believed that they followed the diet "sometimes" (30.5%) or "almost always" (43.2%).

Allergy Treatment Results

Symptom ratings. The allergy-treated group rated their symptoms of vertigo, tinnitus, unsteadiness, and hearing loss, as well as allergy symptoms, for 2 points in time—before beginning allergy treatment (retrospective) and at the time of the questionnaire (currently being treated or had completed treatment). Those patients who had had surgery for their Meniere's disease since starting allergy treatment were excluded from analyses because any changes in symptoms might be due to the surgery rather than the allergy treatment. Results are shown in Table 3. There was a statistically significant improvement from pretreatment to posttreatment on every measure pertinent to the Meniere's symptoms. In addition, patients perceived improvement on frequency of occurrence of all allergy-related symptoms (runny nose, sore throat, ear infection, and eczema), with the exception of frequency of asthma.

Although no statistical comparison was made, the posttreatment data from Table 3 for the allergy-treated group can be informally compared with the control group data presented in Table 2. The allergy-treated group had significantly more severe Meniere's symptoms before treatment than the control group. After treatment their ratings were actually better than ratings of the control group, that is, not only did the treated group show significant improvement in symptoms after allergy treatment but they improved to levels that appeared to be better than those of the control group.

In the allergy-treated group, 78.6% of patients were taking medication for their Meniere's disease symptoms just before starting allergy treatment. Figure 1 shows the responses to the question "How is your dosage now compared to just before beginning allergy treatment?"; 41.4% of patients said that they were not taking medication at that time. Approximately two thirds of these (63.4%) were using medication before allergy treatment. Another 14.1% indicated that they were using a lower dosage of medication than previously.

Overall, 82.6% of patients indicated that they felt better at the time of the questionnaire than they were before starting allergy treatment (Fig 2).

Vertigo control. There was a significant reduction in

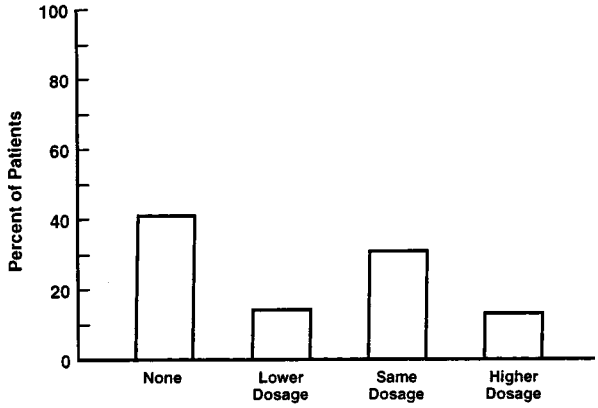

Fig 1. Patient comparison of current medication dosage with dosage just before starting allergy treatment. (Reprinted with permission of House Ear Institute.)

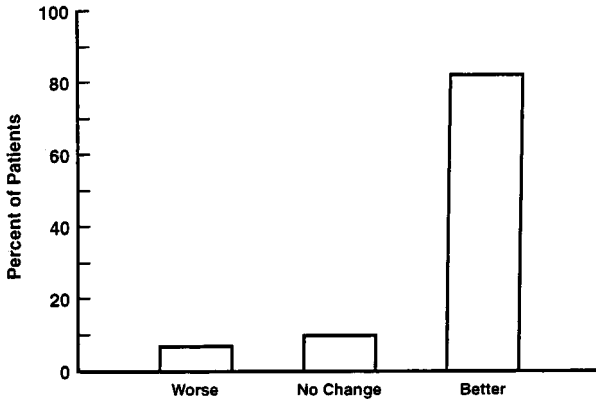

Fig 2. Patient rating of health at present compared with health before starting allergy treatment. (Reprinted with permission of House Ear Institute.)

the number of vertigo spells per month from pretreatment to posttreatment for the allergy-treated group (Table 3). Figure 3 presents the categorization of vertigo control, computed with the AAO-HNS formula. The new guidelines were used, which include a class F for those cases in which secondary treatment was initiated because of disability from vertigo. Patients who went on to have surgical treatment after starting allergy treatment were categorized in this class; 47.9% of the patients had a class A or B result. About one fourth (24.5%) went on to have surgical treatment.

Physician's rating. Ratings of symptom improvement are shown in Table 4 for both the allergy-treated group and the control group. There were statistically significant differences between the treated and control groups for all 3 symptom categories, with a larger proportion of the treated group rated as improved and a smaller proportion of the treated group rated as worse.

Hearing. Hearing results were categorized as "improved," "no change," or "worse" with the AAO-HNS criteria for change of 10 dB or 15%. Results based on pretreatment and last audiologic follow-up are presented in Fig 4 for those subjects with at least 24 months of audiologic follow-up. Caution is warranted because the number of subjects with such data in the control group is quite small. However, there was no difference in the proportion of patients in the 2 groups whose hearing continued to deteriorate.

Table 4. Physician's rating of improvement

	Allergy treated	Control
Vertigo/dizziness (n)	108	14
Improved (%)*	68.5	35.7
No change (%)	24.1	14.3
Worse (%)†	7.4	50.0
Tinnitus (n)	59	9
Improved (%)	55.9	33.3
No change (%)	21.3	11.1
Worse (%)‡	11.9	55.6
Other allergic symptoms (n)	94	6
Improved (%)‡	74.5	16.7
No change (%)	21.3	16.7
Worse (%)†	4.3	66.7

Statistical comparisons were as follows: improved versus no change/worse, and worse versus improved/no change.
*$P < 0.05$.
†$P < 0.001$.
‡$P < 0.01$.

DISCUSSION

This study of 113 patients with Meniere's disease treated for symptoms of allergy with desensitization and diet showed that they had a significant improvement from pretreatment to posttreatment, both in classic allergic symptoms and Meniere's symptoms. The patient ratings of frequency, severity, and interference with everyday activities of their Meniere's symptoms also appeared better after allergy treatment than ratings from a control group of 24 untreated patients. With the AAO-HNS classification, nearly half of the patients achieved complete or considerable vertigo control (class A or B). Hearing was stable or improved in 61.4%.

Gell and Coombs described 4 types of hypersensitivity, with a fifth added later.[20] However, it is important to keep in mind that immunoglobulins are typically present in the perilymph at about 0.001 of the titer present in the serum, which may cause some differences in clinical characteristics of hypersensitivity in this particular target organ.[21,22]

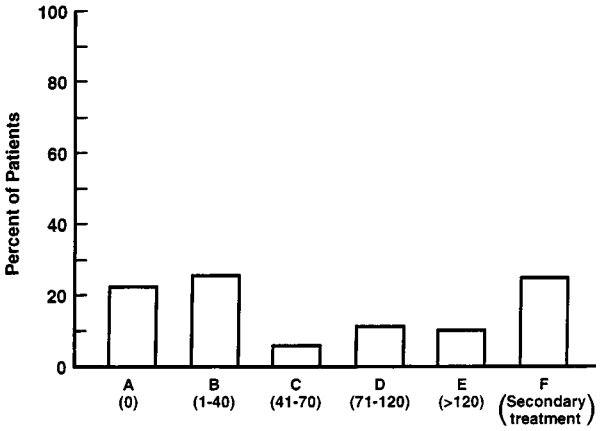

Fig 3. Distribution of AAO-HNS vertigo control categories, based on number of vertigo spells per month before and after treatment. (Reprinted with permission of House Ear Institute.)

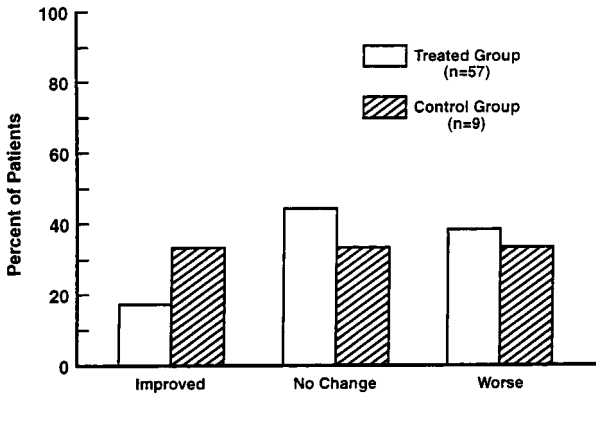

Fig 4. Distribution of hearing improvement categories, based on AAO-HNS criteria (10 dB or 15%), for patients with 24 months or more of follow-up. (Reprinted with permission of House Ear Institute.)

Food antigens can stimulate all 4 Gell and Coombs reactions and are thus much more complex immunologically than inhalant reactions, which only trigger a type I reaction. Despite the fact that, strictly speaking, this may involve a different immune mechanism than classic type I hypersensitivity, such as an immune-complex mediated problem, many who practice clinical allergy tend to use the term *food allergy* for any suspected immune-mediated production of symptoms caused by the ingestion of a food antigen. I theorize that there may be different possible mechanisms by which an allergic reaction results in the production of Meniere's disease symptoms. These have been discussed in detail elsewhere.[23]

First, the endolymphatic sac itself could be a target organ of the allergic reaction. A second proposed mechanism involves a circulating immune complex, such as a food antigen, deposited through the fenestrated blood vessels of the endolymphatic sac, producing inflammation. An increased incidence of circulating immune complexes in the serum has already been described in both Meniere's disease and allergic rhinitis.[11,24] The inflammatory response resulting from the deposition of immune complexes along vascular basement membranes is the hallmark of an immune complex disease. Alternatively, circulating immune complexes may be deposited in the stria, causing the normally intact blood-labyrinthine barrier to leak as a result of increased vascular permeability. In addition to disrupting the normal ionic and fluid balance in the extracapillary spaces, this could facilitate the entry of autoantibodies into the inner ear. Harris and Ryan[7] recently found a 30% incidence of a positive 68-kD autoantibody in the serum of patients with Meniere's disease. Interestingly, they also found that some human subjects with known autoimmune disease have elevated levels of this circulating autoantibody without evidence of hearing loss, suggesting that the antibody had not yet entered the inner ear. Harris and Sharp[25] theorized that another factor must be present to facilitate its expression; this may well be the role played by a food antigen.

A third mechanism, initially proposed by Shambaugh and Wiet,[26] involves a viral antigen/allergic interaction. They suggested that a predisposing viral infection in childhood, such as mumps or herpes, is carried to the inner ear, where it sets up a chronic low-grade inflammation. Although this is not enough to result in hearing loss, it does produce a mild impairment of sac absorption. Something in the system then stimulates excess fluid production. Shambaugh and Wiet theorized that allergies or metabolic abnormalities, such as thyroid or hormonal dysfunction, were likely culprits, causing the sac to decompensate with the resulting production of endolymphatic hydrops.

It would appear that the most effective treatment for allergic endolymphatic hydrops is the prevention of mast cell degranulation. Several mediators are released when the mast cell degranulates, including histamine, serotonin, bradykinin, and a slow-reacting substance of anaphylaxis. Clinically, the antihistamine treatments (meclizine, diphenhydramine, etc) commonly used as an adjunct to lessen the clinical severity of vertigo in affected patients do not change the underlying pathology of a hydropic distention of the endolymphatic space. Pharmacologically, these antihistaminic agents do not block the effects of the other inflammatory mediators that are released with mast cell degranulation. Effective immunotherapy, with its induced immunologic changes,

including the production of an antigen-specific IgG-blocking antibody, can prevent mast cell degranulation. The use of an appropriate elimination diet for documented food allergies can obviously prevent an immune-mediated reaction from occurring at all.

The clinical and histologic evidence that a classic type I hypersensitivity reaction, or food antigen type III circulating immune complex reaction, plays a role in the production of endolymphatic hydrops is too strong to be ignored. Although certainly the addition of specific antigen immunotherapy and dietary elimination did not completely control the symptoms of all patients with Meniere's disease, it did result in statistically significant improvement in symptom control.

Interestingly, despite the fact that a significant number of patients reported that they noted significant improvement in their hearing, no statistically significant audiometric change was found. I suspect that this is due to improved eustachian tube function or a lack of hearing fluctuation. Eighty-five percent of patients had significant nasal congestion before allergy treatment. After treatment, these same patients almost always reported a significant decrease in both nasal and aural fullness. Some individual patients did have dramatic improvements in their hearing levels, which were maintained with allergy treatment. While treating patients with allergic eustachian tube dysfunction who also have sensorineural hearing loss, I have clinically observed that they often report more benefit from amplification after desensitization or dietary therapy, despite no change in their audiometric profiles.

This study was not blinded or placebo controlled. It would be difficult from a clinical standpoint to give patients placebo injections on a weekly or biweekly basis for up to 2 years, the period deemed minimum to assess true changes in the course of Meniere's disease.

Another weakness of this study was its retrospective nature. Now, all patients with Meniere's disease who are being evaluated for allergies are asked to complete a prospective pretreatment questionnaire in the office, so that my coworkers and I may more accurately ascertain what, if any, changes are noted subjectively in those who do pursue allergy immunotherapy or food allergy diet.

CONCLUSION

This study evaluated the efficacy of allergy immunotherapy and dietary elimination as a treatment for patients with Meniere's disease. Indications for allergy testing include bilaterality, a clear relationship between the ingestion of a food or season or weather change with the production of symptoms, a known history of allergy, a family history of allergy, a history of Meniere's symptoms that are either steroid-dependent or sensitive, or failure to respond to the traditional medical and surgical treatment of Meniere's disease. Results indicate that a significant percentage of patients will show improvement in their symptoms of tinnitus and vertigo when receiving specific allergy therapy. This supports the supposition that the inner ear may also be the target, either directly or indirectly, of an allergic reaction.

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Meniere's disease continues to be incompletely understood, although much progress has been made in defining its objective presentations with sophisticated scanning and postural detection technology.

The House Ear Clinic and House Ear Institute of Los Angeles, California, evaluate large numbers of patients with hearing and vestibular disorders. Certainly this population must include a significant number of patients with the presumptive or referring diagnosis of Meniere's disease. Perhaps many, if not most, of these patients have been referred after extensive base evaluations by their otolaryngologists or neurologists. One of the etiologies considered by the Clinic is that of an autoimmune (read "allergic") origin. Dr Derebery has evaluated a substantial population of Clinic patients with a questionnaire, which was designed to elicit information regarding the effect of allergy management on the patients' symptoms of Meniere's disease.

The patients studied were those referred during a given period of time for allergy evaluation and the subsequent offering of therapy for their allergies. The bulk of the patients began allergy treatment; those who did not served as the internal control group. There are clearly some statistical weaknesses in this method, but for the purposes of the study, they do not act to significantly reduce the information gained. Importantly, interference with daily activities was queried, and rightfully so, because this particular disorder is characterized by its effect on patient quality of life.

Specific criteria appear to have been used consistently to select those patients who were referred for allergic evaluation, as well as to apply accepted allergy therapy. A 64% return on the questionnaire was good by usual standards, but one always wonders which patients did not return the questionnaire and why they did not. That is one of the weaknesses of a study based on a questionnaire. However, for those who did return it, the data were checked until complete. Basic statistical comparisons were made appropriately between the treated and nontreated groups.

Dr Derebery's report certainly suggests and supports the hypothesis that, at least in some patients, treatment of underlying allergic disorders may improve the signs and symptoms of Meniere's disease. The data were strong enough to warrant further prospective and statistically strong clinical trials with objective data gathering. Additionally, this study, coming from a well-respected clinician-scientist and a renowned Clinic and Institute, should at the very least lend some credibility to the long-held suspicion regarding a relationship between allergy and Meniere's disease.

Although a dramatic change in the treatment of patients with Meniere's disease would not be warranted based solely on this study, perhaps it will stimulate additional investigation into the identification of those patients with allergic signs and symptoms in whom Meniere's disease has been diagnosed. Longitudinal studies using objective testing (such as posturography and audiometry) could help clarify the association suggested by this article.

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